

THE OSTRACODS OF THE NINEVEH LIMESTONE OF PENNSYLVANIA AND WEST VIRGINIA

By

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INTRODUCTION

The Nineveh Limestone is a thin-bedded fresh water limestone in the upper part, or in the Greene group, of the Dunkard Series of the Permian. Its areal distribution is confined to the southwestern part of Pennsylvania, chiefly Washington and Greene Counties, and to a narrow belt along the upper part of the Ohio River in West Virginia and Ohio. The Nineveh Limestone horizon consists of an alternation of thin, lenticular limestones and shales with a total thickness of about five feet.

The fauna of the Nineveh Limestone is composed entirely of fresh water forms. Ostracods are the only fossil universally distributed in this horizon. Fish teeth and scales, a minute gastropod of the *Pupidae* family, and *Spirorbis* may be found in certain localities of this region.

The *Ostracods* described in this paper were collected from two localities. The first collection was made at Limestone Hill in Wood County, West Virginia, and later material was collected from Nineveh, in Greene County, Pennsylvania.

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SYSTEMATIC DESCRIPTIONS

Family APARCHITIDÆ Ulrich and Bassler

Genus WHIPPLELLA n. gen.

Outline of carapace elliptical to sub-ovate; dorsal aspect ovate to cuneiform. Dorsal margin always arched; ventral margin convex, straight, or slightly concave. Hinge line short, straight, and partially hidden by the protruding shoulder of the one valve. Anterior and posterior ends either rounded or truncated. Surface smooth or pitted.

Eye spots present on the blunter end in some of the species distinguish this as the anterior end. In *Whipplella deltoidea* n. sp. the position of the eye is marked by a group of small tubercles situated just below the median line on the thicker end. In *Whipplella depressa* n. sp. the eye spot is characterized by a change in the type of ornamentation at the place of maximum thickness.

The main characteristic of the genus is its type of overlap. The left valve is the larger and overlaps the right all the way around except along the hinge line where the right valve overlaps the left and generally protrudes over it. The overlap of the left valve over the right is greatest along the middle part of the ventral margin. The two valves may meet evenly along the anterior and posterior ends, or the left valve may overlap the right.

This genus is named in honor of Professor Ralph W. Whipple of Marietta College.

Genotype: *Whipplella cuneiformis* n. sp.

Range: Permian.

Whipplella resembles, in some respects, the genus *Paraparchites*. The overlap in the two genera is, however, just opposite. The right valve of *Paraparchites* overlaps the left along the ventral margin and, at the hinge line, the left valve protrudes over the right. There are also other points which differentiate the two genera. *Paraparchites* commonly has a straight dorsal margin whereas the dorsal margin of *Whipplella* is always arched. In *Paraparchites* the right valve sets into a groove in the left to form the hinge, but in *Whipplella* the hinge is a simple overlap. With the exception of three species, *Whipplella deltoidea* n. sp., *Whipplella magnitata* n. sp., and *Whipplella ninevehensis* n. sp., the outline of the carapace does not resemble that of *Paraparchites*, being more elongated and more obese. The pitted ornamentation present in most species of *Whipplella* is apparently not found in *Paraparchites*.

***Whipplella cuneiformis* n. sp.** (Plate XXV, fig. 5)

Carapace ovate in outline; dorsal view cuneiform. Greatest length just below the median line; greatest height about the middle; greatest thickness one-third of the way from the anterior end along the median line. Hinge line short, occupying about one-fourth of the total length of the shell. Dorsal margin arched; ventral margin convex.

The left valve overlaps the right on all sides except along the hinge line where the overlap is reversed.

Surface ornamentation consists of small, shallow, nearly circular pits which are better developed on the anterior part of the shell. Ornamentation is absent on the overlapping portions of the shell as well as along the posterior end.

Dimensions: maximum length: .84 mm.
maximum height: .59 mm.
maximum thickness: .61 mm.

Whipplella cuneiformis n. sp. closely resembles *Whipplella depressa* n. sp., described in this paper, but differs in the structure of the hinge and in the character of ornamentation.

Holotype: Carnegie Museum No. 6493.

Horizon and locality: Nineveh Limestone at Limestone Hill, West Virginia.

Whipplella depressa n. sp. (Plate XXV, fig. 7)

Carapace sub-rectangular; dorsal view ovate. Greatest length along the median line; greatest height in front of the center; greatest thickness just below the median line, one-third of the way from the anterior end. Hinge line short and straight, depressed between the two equal shoulders of the valves. Dorsal margin arched; ventral margin nearly straight.

The left valve overlaps the right on all sides except along the hinge line where the overlap is reversed. The dorsal overlap is slight.

The surface is coarsely pitted. The pits being irregularly elongate tend to parallel the margins of the shell, especially along the posterior end. The pits cover the entire surface of the shell except the overlapping portions. Two or three larger pits at the place of maximum thickness mark the position of the eye spot.

Dimensions: maximum length: .76 mm.
maximum height: .50 mm.
maximum thickness: .46 mm.

Whipplella depressa n. sp. is distinguished from the other species of this genus by its depressed hinge line. Its ornamentation is much coarser than in any species of *Whipplella* described.

Holotype: Carnegie Museum No. 6491.

Horizon and locality: Nineveh Limestone at Limestone Hill, West Virginia.

Whipplella deltoidea n. sp. (Plate XXV, fig. 1)

Carapace rather large and sub-circular in side view; dorsal view elliptical. Greatest length below the median line; greatest height about the middle; greatest thickness in front of the center along the

median line. From the hinge line the anterior border extends downward at about 135 degrees to a point below the median line, thus truncating the anterior end. The posterior end is broadly rounded. Dorsal margin highly arched; ventral margin convex.

The left valve overlaps the right on the ventral side; on the dorsal side the right valve overlaps the left and protrudes over it so as to obscure the hinge. A slight sinuosity in the margin of the right valve is observed in the middle part on the ventral border where the overlap is greatest. On the anterior and posterior ends the two valves meet about evenly.

The surface of the shell is ornamented with small indistinct pits covering the entire carapace. Along the median line near the anterior end there is a group of small tubercles marking the position of the eye. These tubercles are small, low, and surround a small circular area.

Dimensions: maximum length: 1.48 mm.
 maximum height: 1.16 mm.
 maximum thickness: .81 mm.

This species may be distinguished from other species with which it might be confused by its sub-circular outline and by its protuberant right valve at the hinge line.

Holotype: Carnegie Museum No. 6482.

Horizon and locality: Nineveh Limestone at Nineveh, Pennsylvania.

Whipplella magnitata n. sp. (Plate XXV, fig. 2)

Carapace sub-rhomboidal in outline; in dorsal view elliptical. Greatest length below the median line; greatest height about the middle; greatest thickness along the median line in front of the center. Anterior cardinal angle sharp; posterior cardinal angle rounded. The posterior end is evenly rounded; anterior end truncated. Both dorsal and ventral margins are slightly convex.

The left valve is the larger and overlaps the right on all sides except along the hinge line where the right valve overlaps the left.

The surface of the carapace is smooth. A large, nearly circular spot below the median line and posterior to the center marks the position of the adductor muscle. This spot is darker than the rest of the carapace.

Dimensions: maximum length: 1.74 mm.
 maximum height: .99 mm.
 maximum thickness: .66 mm.

Whipplella magnitata n. sp. somewhat resembles *Whipplella deltoidea* n. sp. but differs from it by its greater length, more truncated

anterior end, longer hinge line, and lack of any surface ornamentation. From *Whipplella ninevehensis* n. sp., described later in this paper, it may be distinguished by its lesser thickness, greater length, longer hinge line, and smooth surface.

Holotype: Carnegie Museum No. 6487.

Horizon and locality: Nineveh Limestone at Nineveh, Pennsylvania.

***Whipplella ninevehensis* n. sp.** (Plate XXV, fig 3)

Outline of the carapace ovate; dorsal view elliptical. Greatest length below the median line; greatest height about the middle; greatest thickness in front of the center. Anterior end truncated; posterior end evenly rounded. Posterior cardinal angle rounded; anterior cardinal angle sharp, about 120 degrees. Hinge line short and straight.

The left valve is the larger and overlaps the right along the ventral margin; along the hinge line the right valve overlaps the left. On the anterior and posterior ends the two valves meet each other about evenly.

Entire surface of the carapace is ornamented with small, shallow pits. The scar of the adductor muscle, just below the median line and posterior to the center, is seen through the shell as a darker colored spot.

Dimensions: maximum length: 1.07 mm.
maximum height: .67 mm.
maximum thickness: .53 mm.

Whipplella ninevehensis n. sp. resembles *Whipplella magnitata* n. sp. by having a truncated anterior end but is easily distinguished from that species by its greater width and greater thickness. From *Whipplella deltoidea* n. sp. this species may be distinguished by its lesser dorsal overlap and its more elongate outline.

Holotype: Carnegie Museum No. 6483.

Horizon and locality: Nineveh Limestone at Nineveh, Pennsylvania.

***Whipplella parvula* n. sp.** (Plate XXV, fig. 6)

Carapace small, sub-elliptical in side view; dorsal view ovate. Greatest length below the median line; greatest height about the middle; greatest thickness along the median line in front of the center. Anterior and posterior cardinal angles about equal. Dorsal margin arched; ventral margin broadly rounded.

The left valve is the larger and overlaps the right on all sides except at the hinge line where the right valve overlaps the left. The hinge has a length of about one-third that of the shell.

The carapace is unornamented.

Dimensions: maximum length: .59 mm.
 maximum height: .38 mm.
 maximum thickness: .31 mm.

Whipplella parvula n. sp. is the most common species of this genus. It has also a wider geographic distribution as it is found in the Nineveh Limestone in both West Virginia and Pennsylvania. From other species of the same genus it is easily distinguished by its small size, its inflated anterior end, and the absence of ornamentation.

Holotype: Carnegie Museum No. 6489.

Horizon and locality: Nineveh Limestone at Nineveh, Pennsylvania and at Limestone Hill, West Virginia.

Whipplella ovata n. sp. (Plate XXV, fig. 4)

The outline of the carapace in side view is sub-elliptical. Greatest length below the median line; greatest height in front of the center; greatest thickness along the median line on the anterior ends of the valves. Anterior end broadly rounded; posterior end slightly rounded. The dorsal margin is broadly rounded; ventral margin slightly convex, tending to parallel the dorsal margin. The hinge line is straight and short, of a length of about one-fourth that of the carapace.

The left valve is the larger and overlaps the right on all sides except at the hinge line where the overlap is reversed.

The surface of the carapace is smooth. The position of the attachment of the adductor muscle, just posterior to the center, is marked in most specimens with a darker-colored spot.

Dimensions: maximum length: .78 mm.
 maximum height: .41 mm.
 maximum thickness: .34 mm.

Whipplella ovata n. sp. may be distinguished from the other smooth forms of this genus, *Whipplella magnitata* n. sp. and *Whipplella parvula* n. sp., by its rather pointed posterior end and its concave ventral border.

Holotype: Carnegie Museum No. 6485.

Horizon and locality: Nineveh Limestone at Nineveh, Pennsylvania.

EXPLANATION OF PLATE XXV.

(All figures magnified 18 times).

1. *Whipplella deltoidea* n. sp. 1a. Left valve. 1b. Dorsal view. 1c. Right valve.
Carnegie Museum No. 6482.
2. *Whipplella magnitata* n. sp. 2a. Left valve. 2b. Dorsal view. 2c. Right valve.
Carnegie Museum No. 6487.
3. *Whipplella ninevehensis* n. sp. 3a. Left valve. 3b. Dorsal view. 3c. Right
valve.
Carnegie Museum No. 6483.
4. *Whipplella ovata* n. sp. 4a. Left valve. 4b. Dorsal view. 4c. Right valve.
Carnegie Museum No. 6485.
5. *Whipplella cuneiformis* n. sp. 5a. Left valve. 5b. Dorsal view. 5c. Right
valve.
Carnegie Museum No. 6493.
6. *Whipplella parvula* n. sp. 6a. Left valve. 6b. Dorsal view. 6c. Right valve.
Carnegie Museum No. 6489.
7. *Whipplella depressa* n. sp. 7a. Left valve. 7b. Dorsal view. 7c. Right valve.
Carnegie Museum No. 6491.